CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. R2-2002-0082

FINAL SITE CLEANUP REQUIREMENTS AND RESCISSION OF ORDER NO. 88-157 FOR:

INTERNATIONAL BUSINESS MACHINES

for the property located at

5600 COTTLE ROAD
SAN JOSE, SANTA CLARA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region (hereafter Board), finds that:

1. **Site Location:** The site is located at 5600 Cottle Road, in San Jose, Santa Clara County, and consists of approximately 350 acres between Cottle Road to the west, Monterey Highway to the northeast, and Highway 85 to the south (Figure 1). Located on the site are 36 buildings used for manufacturing, as well as laboratory and office space. Hazardous waste storage facilities are also located on the site. Areas surrounding the buildings are paved, landscaped, or used for orchards. Adjacent properties are developed for commercial, hospital, and residential use.

2. **Site History:** Beginning in 1955, International Business Machines (IBM) constructed the facility on land previously used for agricultural purposes. IBM has owned and operated the facility continuously since then. Since 1956, IBM has manufactured magnetic disks and heads for computer hardware at the site, using a variety of materials and process chemicals. These parts are assembled into final, computer-related products. Currently, the facility employs over 6,900 people.

   Organic chemicals are and have been used at the facility. These chemicals are and have been handled and stored in bottles, drums, and tanks. Historically, both aboveground and underground tanks were used for chemical storage, however, underground tanks are no longer in use at the facility. Organic chemicals which have been used at the facility include, but are not limited to, 1,1,1-trichloroethane (TCA), trichloroethene (TCE), Freon 11, Freon 12, Freon 113, isopropyl alcohol (IPA), xylenes, acetone, and petroleum naphtha. In the early 1980s, chlorinated hydrocarbons were detected in soil beneath an underground tank farm at the facility. Subsequent investigations showed that organic compounds, such as those listed above, were also present in groundwater beneath and downgradient of the facility. Organic compounds were also detected in soil beneath and adjacent to the areas where these chemicals were stored.

3. **Named Discharger:** IBM is named as the sole discharger because substantial evidence indicates that releases occurred in areas where IBM used and stored chemicals and because IBM owns the property where the releases occurred. If additional information is submitted indicating other parties caused or permitted any waste to be discharged on or downgradient of the site where it entered or could have entered waters of the state, the Board will consider adding those parties' names to this order.

4. **Regulatory Status:** This site was subject to Site Cleanup Requirements (Order No. 88-157) adopted October 21, 1988. The site is a Resource Conservation and Recovery Act (RCRA) facility and is regulated based on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA). Pursuant to the South Bay Multi-Site Cooperative Agreement and the South Bay Ground Water Contamination Enforcement Agreement, entered into on May 2, 1985 (as subsequently amended) by the Board, the U.S. Environmental Protection Agency (EPA), and the California Department of Health Services (DHS), the Board regulates the discharger's remediation activities.

5. **Site Hydrogeology:** The site is located in the Santa Teresa Basin, which is an elongate alluvium-filled bedrock basin covering about 18 square miles. Bedrock hills bound the basin to the northeast and southwest and act as relatively impermeable barriers to groundwater flow. The remaining basin boundaries are Coyote Narrows (inflow boundary), Edenvale Gap between Oak Hill and Edenvale Ridge (outflow boundary), and the area between Oak Hill and the Santa Teresa Hills.

   The aquifers in the basin consist of sand and gravel zones separated by nearly continuous clay and silt zones that restrict the vertical flow of groundwater. Several monitored aquifer zones have been designated within 200 feet of the surface and are referred to as the A-, B-, C-, and D- and deeper aquifer zones, consecutively from the surface downward. Near Edenvale Gap, and locally in other areas, the B- and C-aquifer zones are merged to form the BC-aquifer zone. Because of the complex stratigraphy of the alluvium, aquifer zone designations in some areas are uncertain. All of the aquifer zones are hydraulically interconnected to some degree.

   The local hydrogeology is characterized by a channelized shallow aquifer zone (the A-aquifer zone) that is underlain by alternating sequences of coarser-grained aquifer zones and interbedded aquitard zones. Groundwater flow directions in the aquifer zones vary across the site. Groundwater movement in the A-aquifer zone varies from south to northwest, while groundwater flow directions in the B- and deeper aquifer zones are generally to the northwest, toward Edenvale Gap. Buried stream channel deposits that trend from southeast to northwest within the A-aquifer zone act as the preferential flow path for groundwater in the A-aquifer zone onsite. Buried stream channel deposits are not well-defined offsite or in aquifers below the A-aquifer zone.

   The B-, BC-, C-, and D-aquifer zones are more laterally extensive and coarser-grained than the A-aquifer zone. The onsite B-aquifer zone generally consists of two or three sand and/or gravel units separated by silts or clays. Except in times of extended drought, the B- and deeper aquifers are saturated and confined. The B- and deeper aquifer zones in the vicinity of the site are used as sources of drinking water.

6. **Remedial Investigation:** Soil investigations began in 1980, when TCA, petroleum naphtha, and xylenes were discovered in soil adjacent to an underground storage tank farm. This discovery was followed by extensive groundwater and soil investigations, in which over 1,000 soil borings were drilled and over 350 groundwater monitoring wells were installed. In addition, 30 extraction wells were installed to remove chemicals in the groundwater and control groundwater movement. The four most widespread chemicals detected in groundwater are the following volatile organic compounds (VOCs): Freon 113, TCA, 1,1-dichloroethene (1,1-DCE), and TCE. Historical and recent maximum concentrations of these four compounds detected in samples from onsite groundwater wells (excluding Well RA-22) are summarized in Table 1, below. Other chemicals that have been detected in onsite wells within the past five years are listed in Table 3.

Table 1: On-Site Historical and Current Maximum VOC Concentrations

Compound	Historical Maximum Concentration (µg/L)	2001 Maximum Concentration (µg/L)
Freon 113	40,000	6,200
TCA	84,000	20
1,1-DCE	4,100	44
TCE	800	150

Data from well RA-22 was excluded from this table because it is screened in a near-source portion of the A-Zone that is composed of tight clay and silt that differs significantly from the aquifer zones elsewhere onsite. Original chemical concentrations at Well RA-22 were significantly higher than in other areas, and concentrations have not decreased appreciably during the cleanup period. For example, in October 2001 the TCA concentration at Well RA-22 remained in excess of 200,000 ug/L; no other on-site well contains TCA at a concentration greater than 20 ug/L.

Prior to remediation, Freon 113 and TCA were present in a B-aquifer zone groundwater plume that extended from the western portion of the site to beyond Edenvale Gap, some 3 miles downgradient. The lateral extent of 1,1-DCE in the offsite area was much smaller. TCE contamination was generally restricted to the A-aquifer zone both onsite and immediately offsite of the facility.

Chemical concentrations in offsite groundwater have historically been low relative to drinking water criteria. In offsite aquifer zones that are direct sources of drinking water (B- and deeper aquifer zones), the historic maximum VOC concentrations only slightly exceeded drinking water standards (maximum contaminant levels, or MCLs). Current maximum concentrations of all chemicals in the off-site area are well below their respective MCLs, with the exception of 1,1-DCE, which slightly and intermittently exceeds the MCL (6 micrograms per liter (µg/L)) in one well. Historic and current maximum VOC concentrations in the offsite area are shown in Table 2, below:

Table 2: Off-Site Historical and Current Maximum VOC Concentrations

Compound	Historical Maximum Concentration (µg/L)	2001 Maximum Concentration (µg/L)
Freon 113	1,900	68
TCA	250	22
1,1-DCE	18	6.6
TCE	2	<0.5

The current concentrations of chemicals in off-site B-zone wells, as shown in Table 2, have remained stable since 1996 -1997, although groundwater extraction has continued throughout this period. These data suggest that asymptotic chemical concentrations have been reached. Board staff conclude that further significant reductions in chemical concentrations in the off-site area are not likely to be achieved through continued groundwater extraction. Because chemical concentrations have stabilized at levels at or below drinking water standards, implementation of other potential remedial methods such as enhanced in-situ biodegradation is not warranted for the offsite area.

7. **Adjacent Sites:** Low levels of methyl tert-butyl ether (MTBE) from a gas station on Cottle Road at Blossom Hill Road (west of the site) have been detected intermittently since 1997 in groundwater at

one of IBM's offsite extraction wells. Investigation of this gas station was completed by the property owner prior to current concerns regarding MTBE. There are no other known, nearby sites whose contamination or cleanup activities affect the site. The former Fairchild site at 101 Bernal Road is east and upgradient of the IBM Cottle Road site; however, there has been no evidence that contaminated groundwater from the Fairchild site has migrated to the IBM site.

8. **Interim Remedial Measures:** IBM has implemented soil and groundwater interim remedial measures (IRMs) that included soil excavation and groundwater pump and treat.

8a. **Interim Soil Remedial Measures:** Between 1981 and 1987, IBM removed 65 underground storage tanks. Many of these tanks were replaced with aboveground storage tanks and secondary containment was installed for all bulk tanks remaining on the site. Prior to 1988, IBM removed more than 23,000 cubic yards of soil containing chemicals from various onsite areas; about 90 percent of the soil was from four areas (Tank Farm 001, Tank Farm 067, Building 006, and the Shell Sol 140 release area east of Building 100). The excavated soil was disposed offsite at permitted Class I facilities. The primary chemicals encountered in soil were TCA, acetone, isopropanol, petroleum naphtha, and Freon 113, with lesser amounts of other chemical compounds. The chemical mass removed as a result of soil removal activities was not quantified. By 1987, it was no longer feasible to excavate the remaining contaminated soil because access would require removing buildings and utilities.

8b. **Interim Groundwater Remedial Measures.** Interim measures to clean up the plume included offsite and onsite groundwater extraction systems, which operated from November 1982 until late 1990 when the final remedial systems were started. Onsite, groundwater was extracted using nine A-aquifer zone wells, six B-aquifer zone wells, and two C-aquifer zone wells, all of which were installed along or near the western site boundary at Cottle Road. These wells were intended to control migration of the detected chemicals to the offsite areas. Offsite, groundwater was pumped from both the B- and C-aquifer zones and from the merged BC-aquifer zone near Edenvale Gap. Wells ORB-1 and ORC-1 were positioned to provide mass removal in the center of the offsite chemical plume. Although groundwater at Edenvale Gap met drinking water standards, Wells ORBC-2 and ORBC-3 were installed to protect groundwater quality in the Santa Clara Basin downgradient of Edenvale Gap. Groundwater extracted from these onsite and offsite wells was discharged directly to storm sewers under a National Pollutant Discharge Elimination System (NPDES) permit for the interim remediation measures. Groundwater extraction from the A-aquifer zone wells was discontinued soon after installation of the piping systems because of declining water levels.

In 1988, because of the negative effects that declining groundwater levels had on the interim remediation and to conserve water during a drought period, the Regional Board allowed IBM to reduce extraction volumes (Regional Board Order No. 88-45, which amended Order No. 84-90). Consequently, extraction at many B- and C-aquifer zone wells was discontinued in 1988. Remediation criteria were met at those B-aquifer zone extraction wells that were shut down and at all the C-aquifer zone wells. In addition, Wells ORBC-2 and ORBC-3 were no longer needed for protection of groundwater quality exiting Edenvale Gap.

9. **Feasibility Study:** In June 1987, IBM submitted a *Draft Comprehensive Plan* for the site, as required by Regional Board Order 84-90 and State Board Order WQ 86-8. The plan was and is also consistent with California Health and Safety Code requirements for a final remedial action plan

(RAP) and federal National Contingency Plan (NCP) requirements for a remedial investigation and feasibility study (RI/FS). This comprehensive plan contains (1) a proposed final remediation plan, (2) proposed remediation levels, (3) a remediation alternatives evaluation, (4) a water conservation plan, (5) contingency plans for short-term sub-basin management, and (6) a public health evaluation. The final remediation plan is conceptual and provides a basis for remedial design.

IBM evaluated six alternative cleanup plans for groundwater: (1) monitoring only, (2) protection of beneficial uses at drinking water supply wells, (3) protection of beneficial uses within the aquifer, (4) aquifer protection with a safety factor (assuming stable groundwater levels), (5) remediation to background levels, and (6) aquifer protection with a safety factor (contingency plans based on variable groundwater levels). Alternative 6 was selected because of its ability to: (1) protect public health and the environment, (2) be technically feasible, and (3) be cost effective.

10. **Cleanup Plan:** IBM submitted a draft remedial action plan (RAP) in the *Draft Supplement, Comprehensive Plan* in April 1988. For groundwater, the alternative recommended in the RAP was continued extraction from those extraction wells that most efficiently removed chemicals. To conserve water, the RAP proposed that extraction volumes be decreased in comparison to those volumes extracted during interim remediation; hence extraction would be focused in areas of highest concentration and/or transmissivity. Groundwater extracted onsite would be treated and recharged, or reused. Groundwater extracted offsite would be treated and reused for irrigation and for other uses, or discharged to storm drains. The final groundwater remediation measures proposed in the RAP were accepted by the Board in Order No. 88-157.

    For contaminated soils, the RAP proposed further remediation using soil vapor extraction (SVE). Order No. 88-157 specified a preliminary soil cleanup goal of 1 part per million (ppm) for each chemical. Soil cleanup criteria have been met for the site (as discussed in Finding 12a), and further soil remediation is not required under this order.

11. **Risk Assessment:** A risk assessment for the site was performed for the RAP in 1988. The risk assessment evaluated the chemicals of concern listed in Table 3 and other chemicals no longer detected at the site. From a potential public health threat perspective, the primary exposure route was, and remains, through ingestion of contaminated water. Groundwater in the B- and deeper aquifer zones in the vicinity of the site is currently used as a source of drinking water, and groundwater in the A-aquifer zone is considered a potential source of drinking water. For this reason, more stringent cleanup criteria were established for the B- and deeper zones. Target remediation goals (TRGs) for the A-aquifer zone were set at drinking water standards, whereas the TRGs for the B- and deeper aquifer zones were much lower (approximately one-quarter of the drinking water standard).

    In 2001, a human health risk assessment was conducted at the IBM site to evaluate potential health risks and hazards to occupational workers associated with volatile organic compounds in groundwater. The assessment was based on indoor air samples in Building 001 and outdoor air samples from the surrounding area, in accordance with U.S. Environmental Protection Agency (EPA) and California EPA risk assessment guidance. The results of the assessment indicated that there are no adverse impacts to workers due to VOC vapors emitted from groundwater.

    Pending full remediation, institutional constraints are appropriate to limit on-site exposure to acceptable levels. Institutional constraints include a deed restriction that notifies future owners of

sub-surface contamination and prohibits the use of shallow groundwater beneath the site as a source of drinking water until cleanup standards are met.

12. **Final Remedial Measures:** In accordance with the draft RAP and the terms of Order 88-157, IBM implemented final remedial measures that consisted of soil vapor extraction (SVE) and groundwater extraction, treatment, and recharge.

12a. **Final Soil Remedial Measures Undertaken to Date:** In 1987, IBM conducted pilot studies to assess the effectiveness of SVE at the site. Full-scale SVE began in five areas (Building 004, Building 006/Tank Farm 067, Building 001/100 area, the Building 001 Sump, and the Shell Sol 140 area) between 1990 and 1993. Except for one of the five areas, the shut-off criteria were achieved by the SVE systems, and Board staff approved permanent closure of these systems between 1994 and 1997. The Building 006/Tank Farm 067 area did not meet all of the shut-off criteria because the bulk of the Freon 113 mass in this area is below the water table. For this reason, it was determined that SVE would not be effective in reducing chemical concentrations in the local groundwater. From 1987 through 1997, approximately 70,700 pounds of chemical mass, consisting primarily of petroleum naphtha, Shell Sol 140, and VOCs, were removed by SVE.

12b. **Final Groundwater Remedial Measures Undertaken to Date:** The cleanup plan specified installation of groundwater extraction wells in areas where significant chemical mass could be removed and where migration of chemical-bearing groundwater could be controlled by targeting (1) source areas, (2) transmissive zones in the A-aquifer zone that exceeded the TRGs, and (3) areas in the B-aquifer zone that exceeded the TRGs. Once the new wells were brought online, older wells in less optimal locations were shut down. In addition, IBM constructed groundwater conveyance and treatment facilities for the extracted onsite groundwater. These facilities included an air stripper system, which began operating in late 1990, and a steam stripper system, which was brought online in early 1991. From 1982 until full implementation of the final remediation system in 1991, approximately 8,670 pounds of chemical mass were removed by the groundwater pump and treat system. From 1991 through 2001, an additional 2,410 pounds of chemical mass were removed by the air stripper and steam stripper treatment systems.

Extensive remediation has resulted in significant reductions in contaminant levels both on-site and off-site (see Tables 1 and 2 in Finding 6). Current off-site concentrations of 1,1-DCE are at or below drinking water standards, and the current concentrations of the two other chemicals detected in the off-site area (TCA and Freon 113) are well below the more stringent hazard index-based criteria. TCE has not been detected off-site since 1997. All exceedances of the hazard index-based criteria in the off-site area in recent years have been driven by the 1,1-DCE concentrations.

Groundwater extraction in the A-aquifer zone source areas has not been as effective as anticipated because of low and declining water levels. In 1997, IBM began a pilot study to assess the effects of cessation of pumping in the source areas. The results of the pilot study indicated that cessation of pumping would not appreciably impact the duration of cleanup. Based on these results, the Board approved permanent shutdown of the pilot study A-aquifer zone extraction wells in 2001. In granting the shutdown, Board staff requested that IBM assess the applicability of in-situ remedial methods in on-site areas where groundwater extraction has failed to achieve cleanup standards.

The current extraction system consists of ten onsite A-aquifer zone extraction wells, two onsite B-aquifer zone wells, and three offsite B-aquifer zone extraction wells. Groundwater extracted by

two of the offsite wells (ORB-1 and ORB-7) is discharged directly to the storm sewer under NPDES Permit CA0027961. Groundwater from the remaining extraction wells, including off-site well ORB-6, is treated at the onsite air stripper treatment system and returned to the B-zone aquifer through recharge wells.

13. Basis for Cleanup Standards:

a) **General:** State Water Resources Control Board (State Board) Resolution No. 92-49, "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304," applies to this discharge and requires attainment of background levels of water quality, or the best level of water quality that is reasonable if background levels of water quality cannot be restored, considering all demands being made and to be made on the waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible. In approving any alternative cleanup level less stringent than background, 23 California Code of Regulations (CCR) Section 2550.4 must be applied. Under that section, the Board may establish alternative cleanup levels less stringent than background if it finds that it is technologically or economically infeasible to achieve background and the pollutant in question will not pose a substantial present or potential hazard to human health or the environment as long as the alternative cleanup level is not exceeded. Resolution No. 92-49 further provides that cleanup levels other than background must be consistent with the maximum benefit to the people of the State, must not unreasonably affect present and anticipated beneficial uses of such water, and must not result in water quality less than that prescribed in the Water Quality Control Plan for the San Francisco Bay Basin and other applicable policies.

State Board Resolution No. 68-16 "Statement of Policy With Respect to Maintaining High Quality of Waters in California" also applies. This policy prohibits the degradation of existing water quality.

b) **Beneficial Uses:** The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan), on June 21, 1995. This updated and consolidated plan represents the Board's master water quality control planning document. The revised Basin Plan was approved by the State Water Resources Control Board and the Office of Administrative Law on July 20, 1995, and November 13, 1995, respectively. A summary of regulatory provisions is contained in Title 23, California Code of Regulations, Section 3912. The Basin Plan defines beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater.

Board Resolution 89-39, "Sources of Drinking Water," defines potential sources of drinking water to include all groundwater in the region, with limited exceptions for areas of high TDS, low yield, or naturally high contaminant levels. Groundwater underlying and adjacent to the site qualifies as a potential source of drinking water.

The Basin Plan designates the following potential beneficial uses of groundwater underlying and adjacent to the site:

- Municipal and domestic water supply
- Industrial process water supply
- Industrial service water supply
- Agricultural water supply.

At present, there is no known use of the A-aquifer zone underlying the site for the above purposes; however, the A-aquifer zone is considered a potential source of drinking water. Groundwater from the B- and deeper aquifer zones in the vicinity of the site has been, and continues to be, used for drinking water supply.

On July 21, 1988, the State Board adopted Resolution No. 88-88. One requirement based on Resolution 88-88 was that the IBM remediation plan must result in beneficial use or recharge to the Santa Teresa Basin of a significant amount of extracted groundwater. To address this requirement, groundwater extracted for remediation purposes from the A- and B-aquifer zones onsite and along the property boundary is treated and either used for landscaping irrigation or recharged to the B-aquifer zone. IBM has a goal to reuse 100 percent of the total flow from both onsite and offsite extraction systems, where feasible.

c) **Groundwater Cleanup Standards:** This order revises the cleanup standards that were established in Order 88-157. Like Order 88-157, this order sets more stringent cleanup standards for the B- and deeper aquifer zones compared with the shallow, A-zone aquifer. Consistent with State Board Resolution 92-49, the appropriate cleanup level for each aquifer zone is the highest level of water quality that can be reasonably achieved. More stringent cleanup standards are appropriate for the B- and deeper aquifer zones at this site because the discharger has demonstrated that higher water quality is achievable in those aquifers. Cleanup standards for the A-aquifer zone are set at the more stringent of current DHS or EPA drinking water standards (MCLs or other risk-based criteria). MCLs are appropriate as the target cleanup goal in the A-aquifer zone because the history of remediation at this site and other South Bay sites has established that levels lower than MCLs probably cannot be technologically or economically achieved in near-source areas in the shallow aquifer.

For the B- and deeper aquifer zones at this site, cleanup standards for each chemical of concern are set at performance-based levels that are roughly equal to the current concentrations of those chemicals in the off-site B-zone. These concentrations are above background but generally well below MCLs. As stated in Finding 6, chemical concentrations in extraction and monitoring wells in the off-site area historically impacted by the IBM plume have stabilized at asymptotic levels over the past 5 to 6 years. It is not likely that lower chemical concentrations can be achieved within a reasonable time frame in this area, even if groundwater remediation continued. Thus, the best water quality that can be technologically or economically achieved in the B- and deeper zones has been achieved. As stipulated in Resolution 92-49 and 23 CCR Section 2550.4, the cleanup standard must be set no higher than this level. Because these asymptotic levels are below drinking water standards, groundwater in the B- and deeper zones in the offsite area has been returned to beneficial use as a potential source of drinking water.

By requiring cleanup to drinking water standards in the A-aquifer zone, and to levels significantly more stringent than drinking water standards in the B- and deeper zones, the cleanup standards established in this order are consistent with the maximum benefit to the people of the State, do not unreasonably affect present and anticipated beneficial uses of such water, and do not result in water quality less than that prescribed in the Basin Plan, as required by Resolution 92-49. Consistent with Resolution 68-16, this order prohibits degradation of the water quality that has already been achieved in the B-and deeper zones, and thereby assures preservation of this beneficial use.

14. **Future Changes to Cleanup Standards:** The goal of this remedial action is to restore the beneficial uses of groundwater underlying and adjacent to the site. Results from other sites suggest that full restoration of beneficial uses to groundwater as a result of active remediation may not be possible at some portions of this site. If full restoration of beneficial uses is not technologically nor economically achievable within a reasonable period of time, the discharger may request modification of the cleanup standards or establishment of a containment zone, a limited groundwater pollution zone where water quality objectives are exceeded. Conversely, if new technical information indicates that cleanup standards can be surpassed, the Board may decide that further cleanup actions should be taken.

15. **Reuse or Disposal of Extracted Groundwater:** Board Resolution 88-160 allows discharges of extracted, treated groundwater from site cleanups to surface waters only if it has been demonstrated that neither reclamation nor discharge to the sanitary sewers is technically and economically feasible. As mentioned in Paragraph 12b, State Board Resolution No. 88-88 similarly requires that extracted groundwater be used or recharged, where feasible.

16. **Basis for 13304 Order:** The discharger has caused or permitted waste to be discharged or deposited where it is or probably will be discharged into waters of the State and creates or threatens to create a condition of pollution or nuisance.

17. **Cost Recovery:** Pursuant to California Water Code Section 13304, the discharger is hereby notified that the Board is entitled to, and may seek reimbursement for, all reasonable costs actually incurred by the Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, required by this Order.

18. **CEQA:** This action is an order to enforce the laws and regulations administered by the Board. As such, this action is categorically exempt from the provisions of the California Environmental Quality Act (CEQA) pursuant to Section 15321 of the Resources Agency Guidelines.

19. **Notification:** The Board has notified the dischargers and all interested agencies and persons of its intent under California Water Code Section 13304 to prescribe site cleanup requirements for the discharge, and has provided them with an opportunity to submit their written comments.

20. **Public Hearing:** The Board, at a public meeting, heard and considered all comments pertaining to this discharge.

IT IS HEREBY ORDERED, pursuant to Section 13304 of the California Water Code, that the discharger (or its agents, successors, or assigns) shall cleanup and abate the effects described in the above findings as follows:

A. PROHIBITIONS

1. The discharge of wastes or hazardous substances in a manner that will degrade water quality or adversely affect beneficial uses of waters of the State is prohibited.

2. Further significant migration of wastes or hazardous substances through subsurface transport to waters of the State is prohibited.

3. Activities associated with the subsurface investigation and cleanup that will cause significant adverse migration of wastes or hazardous substances are prohibited.

B. CLEANUP PLAN AND CLEANUP STANDARDS

1. **Implement Cleanup Plan:** The discharger shall continue to implement the cleanup plan described in Finding 10 until cleanup standards are met. This cleanup plan may be revised if emerging remediation technologies, such as in-situ chemical treatment methods, are shown to be more effective at reducing chemical mass.

2. **Groundwater Cleanup Standards:** The groundwater cleanup standards discussed in Finding 13 and summarized in Table 3 shall be met in all wells identified in the Self-Monitoring Program.

Table 3. Groundwater Cleanup Standards

	Cleanup Standard (µg/L)	
Chemical	**A-Aquifer Zone [1]**	**B- and Deeper Aquifer Zones [2]**
1,1,1-Trichloroethane	200	40
1,1-Dichloroethane	5	---
1,1-Dichloroethene	6	6
cis-1,2-Dichloroethene	6	---
Benzene	1	1
Chloroform	80 [3]	---
Freon 113	1200	120
Methylene Chloride	40 [4]	---
Perchloroethylene	5	---
Trichloroethylene	5	3
Xylenes (total)	1750	---

[1] Cleanup standards for the A-zone aquifer are California Department of Health Services 2002 Maximum Contaminant Levels (MCL), except as otherwise noted.

[2] Cleanup standards for the B- and deeper aquifer zones are performance-based standards derived from 2001 maximum concentrations in B-zone wells, as reported in Harding ESE, Quarterly Groundwater Monitoring Report, 4th Quarter 2001.

[3] U.S. Environmental Protection Agency 2001 MCL.

[4] California Department of Health Services 2002 Action Level.

µg/L = micrograms per liter (equivalent to parts per billion)

--- Not detected in B- and deeper zones; not a chemical of concern

C. TASKS

1. PROPOSED INSTITUTIONAL CONSTRAINTS

COMPLIANCE DATE: December 31, 2002

Submit a technical report acceptable to the Executive Officer documenting procedures to be used by the discharger to prevent or minimize human exposure to soil and groundwater contamination prior to meeting cleanup standards. Such procedures shall include a deed restriction prohibiting the use of shallow groundwater as a source of drinking water.

2. IMPLEMENTATION OF INSTITUTIONAL CONSTRAINTS

COMPLIANCE DATE: 60 days after Executive Officer approval

Submit a technical report acceptable to the Executive Officer documenting that the proposed institutional constraints have been implemented.

3. EVALUATION OF ALTERNATIVE REMEDIAL METHODS

COMPLIANCE DATE: December 31, 2002

Submit a technical report acceptable to the Executive Officer evaluating the feasibility of using alternative remedial methods, such as in-situ chemical oxidation or enhanced anaerobic bioremediation, to achieve significant chemical mass reductions in source areas where groundwater extraction has been shown to be incapable of achieving target remediation goals. The report should include:

a. A summary of all source areas and other portions of the site where groundwater extraction has failed to achieve target remediation goals

b. A comparison of all alternative remediation methods that were considered in the evaluation

c. A detailed summary of the results of the evaluation

d. Recommendations based on the evaluation results.

4. FIVE-YEAR STATUS REPORTS

COMPLIANCE DATE: October 1, 2003; October 1, 2008; etc.

Submit a technical report acceptable to the Executive Officer evaluating the effectiveness of the approved cleanup plan. The report should include:

a. A summary of the cleanup plan's effectiveness in controlling contaminant migration and protecting human health and the environment

b. A comparison of contaminant concentration trends against cleanup standards

c. A comparison of anticipated versus actual costs of cleanup activities

d. Performance data (e.g., groundwater volume extracted, chemical mass removed, mass removed per million gallons extracted)

e. Cost effectiveness data (e.g., cost per pound of contaminant removed)

f. A summary of additional investigations (including results) and significant modifications to remediation systems

g. Additional remedial actions (if applicable) proposed to meet cleanup standards, including time schedule.

If cleanup standards have not been met and are not expected to be met within a reasonable time, the report should assess the technical practicability of meeting cleanup standards and may propose an alternative cleanup strategy. These status reports will be submitted at 5-year intervals until site closure has been attained.

5. PROPOSED CURTAILMENT

COMPLIANCE DATE: 60 days prior to proposed curtailment

Submit a technical report acceptable to the Executive Officer containing a proposal to curtail remediation. Curtailment includes system closure (e.g., well abandonment), system suspension (e.g., cease extraction but retain well), and/or significant system modification (e.g., major reduction in extraction rates, or closure of individual extraction wells within extraction network). The report should include the rationale for curtailment, and should demonstrate that cleanup standards established in this order have been met, contaminant concentrations are stable, and contaminant migration potential is minimal. The report shall include a schedule for implementation. For proposed curtailment in the offsite area, the report must propose measures (for example, a monitoring plan and contingencies such as maintaining extraction wells in operable condition) to ensure that curtailment of extraction in the offsite area will not jeopardize the beneficial use of groundwater in the vicinity of the site as a potential source of drinking water, and that existing water supply wells within the offsite area impacted by the contaminant plume can be returned to production.

6. IMPLEMENTATION OF CURTAILMENT

COMPLIANCE DATE: 60 days after curtailment

Submit a technical report acceptable to the Executive Officer documenting completion of the tasks identified in Task 5.

7. EVALUATION OF NEW HEALTH CRITERIA

COMPLIANCE DATE: 90 days after requested by Executive Officer

Submit a technical report acceptable to the Executive Officer evaluating the effect on the approved cleanup plan of revising one or more cleanup standards in response to revision of drinking water standards, maximum contaminant levels, or other health-based criteria.

8. EVALUATION OF NEW TECHNICAL INFORMATION

COMPLIANCE DATE: 90 days after requested by Executive Officer

Submit a technical report acceptable to the Executive Officer evaluating new technical information that bears on the approved cleanup plan and cleanup standards for the site. In the case of a new cleanup technology, the report should evaluate the technology using the same criteria used in the *Comprehensive Plan*. Such technical reports shall not be requested unless the Executive Officer determines that the new information is reasonably likely to warrant a revision in the approved cleanup plan or cleanup standards.

Delayed Compliance: If the discharger is delayed, interrupted, or prevented from meeting one or more of the completion dates specified for the above tasks, the dischargers shall promptly notify the Executive Officer and the Board may consider revision to this Order.

D. PROVISIONS

1. **No Nuisance**: The storage, handling, treatment, or disposal of polluted soil or groundwater shall not create a nuisance as defined in California Water Code Section 13050(m).

2. **Good Operation & Maintenance**: The discharger shall maintain in good working order and operate as efficiently as possible any facility or control system installed to achieve compliance with the requirements of this Order.

3. **Cost Recovery**: The discharger shall be liable, pursuant to California Water Code Section 13304, to the Board for all reasonable costs actually incurred by the Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, required by this Order. If the site addressed by this Order is enrolled in a State Board-managed reimbursement program, reimbursement shall be made pursuant to this Order and according to the procedures established in that program. Any disputes raised by the dischargers over reimbursement amounts or methods used in that program shall be consistent with the dispute resolution procedures for that program.

4. **Access to Site and Records**: In accordance with California Water Code Section 13267(c), the discharger shall permit the Board or its authorized representative:

   a. Entry upon premises in which any pollution source exists, or may potentially exist, or in which any required records are kept, which are relevant to this Order.

   b. Access to copy any records required to be kept under the requirements of this Order.

   c. Inspection of any monitoring or remediation facilities installed in response to this Order.

   d. Sampling of any groundwater or soil, which is accessible or may become accessible, as part of any investigation or remedial action program undertaken by the dischargers.

5. **Self-Monitoring Program**: The discharger shall comply with the Self-Monitoring Program as attached to this Order and as may be amended by the Executive Officer.

6. **Contractor / Consultant Qualifications**: All technical documents shall be signed by and stamped with the seal of a California registered geologist, a California certified engineering geologist, or a California registered civil engineer.

7. **Lab Qualifications**: All samples shall be analyzed by State-certified laboratories or laboratories accepted by the Board using approved EPA methods for the type of analysis performed. All laboratories shall maintain quality assurance/quality control (QA/QC) records for Board review. This provision does not apply to analyses that can only reasonably be performed on-site (e.g. temperature).

8. **Document Distribution**: Copies of all correspondence, technical reports, and other documents pertaining to compliance with this Order shall be provided to the following agencies, unless otherwise directed by these agencies:

   a. City of San Jose Environmental Services Department

   b. County of Santa Clara, Department of Environmental Health

   c. Santa Clara Valley Water District

   The Executive Officer may modify this distribution list as needed.

9. **Reporting of Changed Owner or Operator**: The discharger shall file a technical report on any changes in site occupancy or ownership associated with the property described in this Order.

10. **Reporting of Hazardous Substance Release**: If any hazardous substance is discharged in or on any waters of the State, or discharged or deposited where it is, or probably will be, discharged in or on any waters of the State, the discharger shall report such discharge to the Regional Board by calling (510) 622-2300 during regular office hours (Monday through Friday, 8:00 to 5:00).

    As directed by the Board, a written report shall be filed with the Board within five working days. The report shall describe: the nature of the hazardous substance, estimated quantity involved, duration of incident, cause of release, estimated size of affected area, nature of effect, corrective actions taken or planned, schedule of corrective actions planned, and persons/agencies notified.

    This reporting is in addition to reporting to the Office of Emergency Services required pursuant to the Health and Safety Code.

11. **Rescission of Existing Order**: This Order supercedes and rescinds Order No. 88-157.

12. **Periodic SCR Review**: The Board will review this Order periodically and may revise it when necessary.

I, Loretta K. Barsamian, Executive Officer, do hereby certify that the foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on August 20, 2002.

Loretta K. Barsamian
Executive Officer

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FAILURE TO COMPLY WITH THE REQUIREMENTS OF THIS ORDER MAY SUBJECT YOU TO ENFORCEMENT ACTION, INCLUDING BUT NOT LIMITED TO: IMPOSITION OF ADMINISTRATIVE CIVIL LIABILITY UNDER WATER CODE SECTIONS 13268 OR 13350, OR REFERRAL TO THE ATTORNEY GENERAL FOR INJUNCTIVE RELIEF OR CIVIL OR CRIMINAL LIABILITY

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Attachments: Site Map, Self-Monitoring Program

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

SELF-MONITORING PROGRAM FOR:

INTERNATIONAL BUSINESS MACHINES

for the property located at

5600 COTTLE ROAD
SAN JOSE
SANTA CLARA COUNTY

1. **Authority and Purpose:** The Board requests the technical reports described in this Self-Monitoring Program pursuant to Water Code Sections 13267 and 13304. This Self-Monitoring Program is intended to document compliance with Order No. R2-2002-0082 (Site Cleanup Requirements). The discharger may propose changes in the attached table; any proposed changes are subject to Executive Officer approval.

2. **Monitoring:** The dischargers shall measure groundwater elevations in monitoring wells, and shall collect and analyze representative samples of groundwater according to the attached schedule. The dischargers shall sample new monitoring or extraction wells quarterly for the first year after installation, and shall analyze groundwater samples for the same constituents as neighboring wells.

3. **Semiannual Monitoring Reports:** The dischargers shall submit semiannual monitoring reports to the Board no later than 45 days following the end of the reporting period (e.g., report for the first semiannual period, January through June, would be due August 14). The reports shall include:

    a. Transmittal Letter: The transmittal letter shall discuss any violations during the reporting period and actions taken or planned to correct the problem. The letter shall also note any significant changes observed in monitoring results. The letter shall be signed by the discharger's principal executive officer or his/her duly authorized representative, and shall include a statement by the official, under penalty of perjury, that the report is true and correct to the best of the official's knowledge.

    b. Groundwater Elevations: Groundwater elevation data shall be summarized (e.g., in tabular form) and shall be represented by hydrographs of wells in three representative locations (onsite, offsite, and downgradient). Groundwater elevation maps should be prepared for each monitored water-bearing zone and presented in each semiannual report.

    c. Groundwater Analyses: Groundwater sampling data shall be presented in tabular form, and, as appropriate, an isoconcentration contour map shall be prepared for each key contaminant for each monitored water-bearing zone. The report shall indicate the analytical method used, detection limits obtained for each reported constituent, and a summary of QA/QC data. Historical groundwater sampling results shall be summarized in tabular form annually. The reports shall identify significant changes in contaminant concentrations since the last report,

and offer technical explanations for the observed changes. Supporting data, such as laboratory data sheets, need not be included (however, see record keeping – below.)

d. Groundwater Extraction: If applicable, the report shall include groundwater extraction results in tabular form, for each extraction well and for the site as a whole, expressed in gallons per minute and total groundwater volume extracted for the reporting period. The report shall also include estimates of contaminant removal from groundwater extraction wells and from other remediation systems, expressed in units of chemical mass per day and mass removed for the reporting period. Historical mass removal results shall be included annually in the February 14 monitoring report.

4. **Status Report:** The discharger shall submit quarterly status reports that describe relevant work completed during the quarterly reporting period (e.g., site investigations, interim remedial measures) and work planned for the following quarter. This status report shall be submitted separately for the first and third quarters of each year, and shall be combined with the semiannual monitoring reports for the second and fourth quarters.

5. **Violation Reports:** If the dischargers violate requirements in the Site Cleanup Requirements, the dischargers shall notify the Board office by telephone as soon as practicable once the dischargers have knowledge of the violation. Board staff may, depending on violation severity, require the dischargers to submit a separate technical report on the violation within five working days of the telephone notification.

6. **Other Reports:** The discharger shall notify the Board in writing prior to any site activities, such as construction or underground tank removal, which have the potential to cause further migration of contaminants or which would provide new opportunities for site investigation.

7. **Record Keeping:** The discharger or its agent shall retain data generated for the above reports, including laboratory results and QA/QC data, for a minimum of six years after origination and shall make them available to the Board upon request.

8. **SMP Revisions:** Revisions to the Self-Monitoring Program may be ordered by the Executive Officer, either on his/her own initiative or at the request of the discharger. Prior to approval of a revised SMP, the Executive Officer will consider the burden, including costs, of associated self-monitoring reports relative to the benefits to be obtained from these reports.

I, Loretta K. Barsamian, Executive Officer, hereby certify that this Self-Monitoring Program was adopted by the Board on August 20, 2002.

Loretta K. Barsamian
Executive Officer

Attachment: Table 1, Chemical Analysis Schedule for Groundwater Samples

Table 1. Chemical Analysis Schedule for Groundwater Samples
Groundwater Self-Monitoring Program
IBM
San Jose, California

Well No.	Sampling Frequency	Analytical Method
Onsite Monitoring Wells		
A-01	Q	8260B, 8015B (S.Sol), Cr/Cr+6
A-07	SA	8021B
A-10	SA	8021B
A-11	Q	8260B
A-18	SA	8260B, 8015B (S.Sol)
A-20	SA	8021B
A-21	A	8021B
A-22	A	8260B, 8015B (S.Sol, Pet Nap), 8270 (Isoph)
A-24	SA	8260B
A-25	A	8021B
A-28	SA	8021B, 8015B (S.Sol), Cr/Cr+6
A-30	SA	8021B
A-31	SA	8021B
A-32	A	8260B, 8015B (S.Sol), Cr/Cr+6
A-38	SA	8021B, 8015B (S.Sol)
A-39	Q	8260B, 8015B (S.Sol)
A-40	A	8021B
A-41	Q	8260B, 8015B (S.Sol)
A-45	SA	8021B
A-49	A	8021B
A-55	A	8021B
A-61	SA	8260B, 8270 (NMP)
A-69	A	8021B
A-71	A	8021B, 8015B (S.Sol), Cr/Cr+6
A-72	A	8021B, 8015B (S.Sol)
A-77	A	8021B
B-02	A	8021B
B-04	Q	8021B
B-05	A	8021B
B-06	SA	8260B, 8015B (S.Sol)
B-10	SA	8260B
B-12	A	8021B
B-13	A	8021B
B-14	A	8021B
B-16	A	8021B
B-22	Q	8260B
B-24	Q	8260B
B-33	A	8021B
B-35	SA	8021B
B-36	A	8021B
B-47	SA	8021B
B-48	SA	8021B
C-09	A	8021B
C-21	SA	8021B
C-22	SA	8021B
RA-06	SA	8021B
RA-05	SA	8021B, Cr/Cr+6
RA-13	SA	8021B

Well No.	Sampling Frequency	Analytical Method
Offsite Monitoring Wells		
01-B	A	8021B
02-A	A	8021B
02-B	Q	8021B
02-C	A	8021B
05-B	Q	8021B
05-C	SA	8021B
09-B	Q	8021B
09-D	A	8021B
10-B	A	8021B
13-B	Q	8021B
13-D	A	8021B
15-B	SA	8021B
18-B	A	8021B
20-B	Q	8021B
23-B	Q	8021B
24-B	Q	8021B
29-B	Q	8021B
30-BC	Q	8021B
38-BC	A	8021B
45-BC	A	8021B
46-BC	A	8021B
Onsite Extraction Wells		
A-17	Q	8260B, 8015B (Pet Nap)
A-53	Q	8260B
RA-02	Q	8260B
RA-11	Q	8260B
RA-12	Q	8260B
RA-14	Q	8260B
RA-22	Q	8260B, Cr/Cr+6, 8270 (Isoph, 1,4-dioxane), 8015B (S.Sol, Pet Nap)
RA-24	Q	8260B, 8015B (S.Sol)
RA-25	Q	8260B, 8015B (S.Sol)
RA-26	Q	8021B
RA-27	Q	8260B
RA-29	Q	8260B
RA-30	Q	8260B
RA-31	Q	8021B
RA-32	Q	8021B
RB-07	Q	8021B
RB-08	Q	8021B

Table 1. Chemical Analysis Schedule for Groundwater Samples
Groundwater Self-Monitoring Program
IBM
San Jose, California

Well No.	Sampling Frequency	Anlytical Method
Offsite Extraction Wells		
12-A	Q	8021B
ORA-4	Q	8021B
ORA-5	Q	8021B
ORB-1	Q	8021B
ORB-6	Q	8260B & MTBE
ORB-7	Q	8021B
ORC-1	Q	8021B
Public/Private Wells (Offsite)		
03	A	8021B
37	A	8021B
58	A	8021B
61	A	8021B
62	A	8021B
63	A	8021B
64	A	8021B
65	A	8021B
69	A	8021B
70	A	8021B
71	A	8021B
72	A	8021B
73	A	8021B
77	A	8021B
78	A	8021B

Well No.	Sampling Frequency	Anlytical Method
Onsite Recharge Wells		
BR-1	Q	8021B
BR-2	Q	8021B
Production Wells (Onsite)		
W-3	A	8021B
W-4	A	8021B
W-5	A	8021B
W-6	A	8021B
W-7	A	8021B
W-8	A	8021B
Irrigation Wells (Onsite)		
CH-H	A	8021B
Felice	A	8021B
NBoyce	A	8021B
Rubino	A	8021B
Swick	A	8021B
Yosh	A	8021B

NOTES:

Water levels will be measured in all of these wells quarterly.

Abbreviations for frequencies are:

Q	Quarterly
SA	Semiannually (2 times a year)
A	Annually

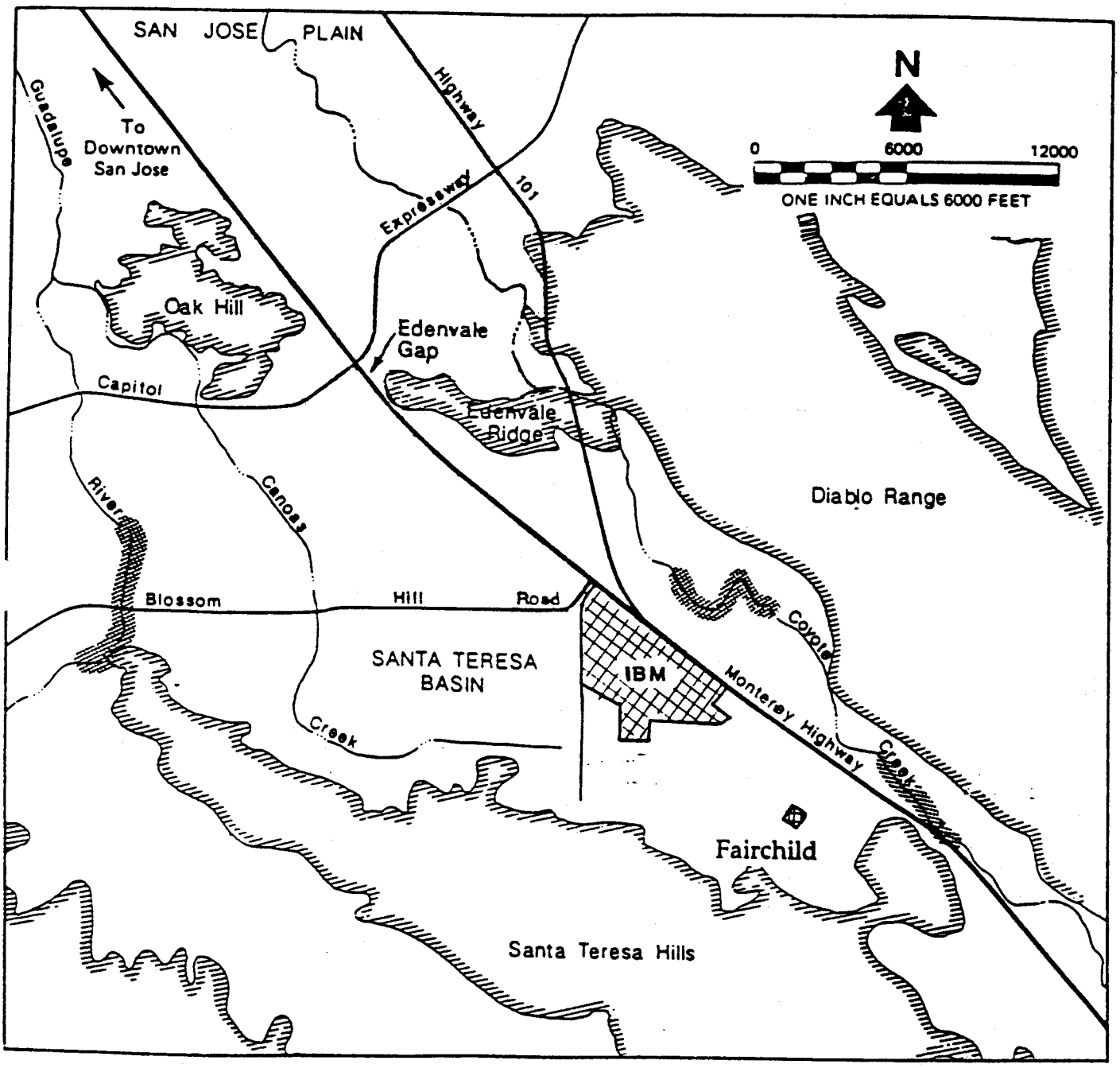
Abbreviations for chemicals are:

Cr	Chromium
Cr+6	Hexavalent Chromium
Isoph	Isophorone
MTBE	Methyl tert-Butyl Ether
NMP	n-Methyl-2-Pyrrolidone
Pet Nap	Petroleum Naphtha
S.Sol	Shell Sol 140

Test Methods:

8015B	Leaking Underground Fuel Tank Manual, Total Petroleum Hydrocarbons (TPH) in the range C6 - C22 (for Shell Sol 140) or C6 - C12 (for Petroleum Naphtha)
8021B	EPA Test Method 8021B, Volatile Organic Compounds by Gas Chromatography (GC); may be replaced by 8260B
8260B	EPA Test Method 8260B, Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)
8270C	EPA Test Method 8270C, Semivolatile Organic Compounds by GC/MS, for isophorone or n-methyl-2-pyrrolidone
Cr/Cr+6	EPA Test Method 6010B, Chromium by Inductively Coupled Plasma - Atomic Emission Spectrometry (ICP) and EPA Test Method 7196A - Hexavalent Chromium by Colorimetric

Location Map



LEGEND

Bedrock

SCVWD recharge ponds